



Effect of Substrate Temperature on Aluminium Thin Films Prepared by RF-Magnetron Sputtering

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Abstract

Pure aluminium thin films were sputtered on steel substrates at 40°C, 60°C, 80°C and 100°C substrate temperatures through rf magnetron sputtering.

Microstructural and topographical characterizations were undertaken through SEM, AFM and XRD techniques. SEM imaging revealed considerable microstructural evolution with change in substrate temperature. The morphology of the films consisted of coherent long columns extending from one edge to the other of the substrate surface with terraces between adjacent structures. The topographical dependence of the thin films with changes in substrate temperature was studied by AFM. As the temperature increased, the surface structures gradually interconnected resulting in reduction of terraces. Quantitative AFM analysis further revealed that increase in temperature, decreases the root mean square roughness, decrease in valleys and PSD correlation length. The XRD pattern at 80°C and 100°C revealed slight influence of these temperatures on the crystallinity of the aluminium thin films.